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ABSTRACT

The objectives of the Center for Research in Scientific Communication at the University of Minnesota, Saint Paul, are to assist scientists in short-term communication projects; to produce, through research, new knowledge in the area of scientific communicaton; and to provide regular, systematic, and experimental analysis of communication variables in information exchange among scientists. This paper provides a chronological account of the center's accomplishments; completed and future projects are discussed. (Author/KS)

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A CENTER FOR RESEARCH IN SCIENTIFIC COMMUNICATION

by

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Abstract: A chronological account of the Center for Research in Scientific Communication is presented; completed and future projects are discussed. The objectives of the Center are (1) to assist scientists by helping them in short term communication projects, (2) to produce through research new knowledge in the area of scientific communication, and (3) to provide regular, systematic and experimental analysis of communication variables in information exchange among scientists.

Key words: Linkers, Lateralization of Knowledge, Management of Science

In March, 1974, the Department of Rhetoric, College of Agriculture, University of Minnesota, St. Paul, proposed a feasibility study to assess needs of agricultural scientists in the area of scientific communication. The initial project description envisioned a need to (1) co-ordinate and (2) conduct seminal communication research projects in direct and indirect instruction, agricultural extension, and the Agricultural Experiment Station. This article will discuss (1) the rationale for the establishment of the Center, (2) the feasibility study, (3) personnel involved in the Center, (4) accomplishments of the Center, and (5) future projects.

Rationale

Research into the nature of scientific communication has lagged behind technical advancement. As Day (1975) indicates, "it is within only relatively recent years that a scientific engagement of communication problems has reached the visibility and importance that plainly it long deserved." For example, of the more than 100 research units described in the 1973-74 Communication Directory, only five appear to be involved with research about the communication of scientists. Compton (1973) points out that several scientific communication research centers have been terminated because of inadequate support. Centers which are

presently operative focus on the increase of public understanding of scientific information through mass media or focus on information retrieval and selective information dissemination services. Griffin (1967) concludes that the practical or "applied" science technology, and the application of new knowledge is an over-arching purpose of agricultural research and co-operative extension. A reluctance to conduct research in these areas is apparent, and the level of communication is frequently rather low among those engaged in laboratory research. Both Baden (1974) and the National Science Foundation (1973) report a need for establishing new communication networks within the sciences, systematic conducting of research in channel and media alternatives and, most importantly, an understanding of the effects of the communication of scientists in all fields.

An increased trend to organize research in the general field of communication is apparent. Few centers, however, deal exclusively with research in agriculture, scientific, and/or technical communication. The research in scientific communication at the University of Minnesota, St. Paul, has been directed mainly at (1) accuracy and adequacy of public information about science, (2) a specific commitment to the agricultural sciences, and (3) the development of hypotheses and research designs to study scientific communication essential for the development of innovation and new knowledge. Crane (1972) asserts that "scientific growth is related to the communication practices of scientists...by personal communication rather than through the literature." Based on the concerns for the practice

of communication among scientists, a feasibility study was proposed to be conducted among selected scientists at the University of Minnesota.

Feasibility Study

Based upon the above concerns, a multiple-indicator approach to measure selected communication practices of scientists within the College of Agriculture at the University of Minnesota, St. Paul, was established. The project director acquired input from faculty members of the College of Agriculture and communicologists who worked in scientific communication at other universities in order to create a questionnaire. The questionnaire assessed the (1) frequency of involvement of scientists in formal communication events concerning their research, (2) nature of the audiences receiving information via formal communication events (channels), (3) perceptions of ease or difficulty of isolated communication behaviors, (4) nature of audiences receiving information via informal communication contacts, (5) self-perceptions regarding ability to communicate scientific and technical information, and (6) familiarity with either the professional practice of technical communication or research in the field of diffusion or the transfer of technology.

The results indicated that agricultural scientists were primarily involved in traditional forms of technical communication, namely journal articles, convention papers and written research reports. After their colleagues, most formal communication is directed to administrators. Scientists lack confidence in pre and post audience analysis; feedback procedures and processing; composition and writing; biographical search;

layout design; and data analysis and presentation. Respondents also indicated that colleagues, graduate research assistants, and other scientists were most often the recipients of informal communication. The scientists had a strong positive view of themselves as competent communicators. Scientists seldom collaborate with "professional communicators," and few were aware of published research in scientific communication.

Based on the results of the survey, the Department of Rhetoric proposed the establishment of the Center for Research in Scientific Communication to be funded through the Minnesota Agriculture Experiment Station and the University of Minnesota College of Agriculture. The objectives of the Center are (1) to assist scientists by helping them in short term communication projects, (2) to produce through research new knowledge in the area of scientific communication and (3) to provide regular, systematic and experimental analysis of communication variables in information exchange among scientists.

Center Research Committee

The Center for Research in Scientific Communication consists of a nucleus of nine communication research faculty members, graduate research assistants, and undergraduate research assistants. Faculty members' backgrounds include speech communication, written communication, and statistical and research methodology. Graduate research assistants have backgrounds in technical communication and/or research strategies. Undergraduate research assistants are juniors or seniors who have developed competencies in expository, professional and technical writing and speaking. In addition, the Center can call on divergent resources of a large metropolitan university,

especially scientists in the College of Agriculture, and a multitude of special programs and professional communication organizations.

The Center recruits and trains undergraduate research assistants to work with scientists. Scientists interview these linkers prior to beginning a project and evaluate the working relationship upon the project's completion. Both the scientist and the student research assistant have access to faculty on the Center Research Committee throughout the project.

The Department of Rhetoric at the University of Minnesota is a suitable location for the Center as the Technical Communication academic curriculum is part of the Department. The curriculum includes courses in the following areas: Interpersonal Communication; Discussion; Professional Writing; Scientific and Technical Writing; Training in Business and Industry; Studies in Organizational Communication; Managerial Communications; Principles of Language Development; Scientific and Technical Presentations; Research in Communication Strategies; Writing for Publication; Transfer of Technology; Information Mapping; and Communication in Technological and Environmental Impact Assessment. These courses and others provide the technical communication student with the educational background needed to assist scientists from various disciplines. Most technical communication majors have a minor or major in the sciences as well.

Accomplishments

During the past two years the Center has assisted laboratory scientists on technology reports, seminars, follow-up evaluations, and experimental research projects. Undergraduate research assistants who worked on these

projects are designated "linkers" to suggest their role as a link between the scientist and the intended audience. Linkers have assisted scientists in writing communication journal articles, research grant proposals, technical books and research reports. Disciplines included Horticulture, Veterinary Medicine, Civil Engineering, Soil Science, Agricultural Economics and Agronomy. Specific topics ranged from "Brucellosis in Sheep" to "Structural Design and Theory Construction."

Although the linker projects have yielded some of the Center's most visible results, other projects have provided a useful research base. Reports have been issued on technology assessment processes ("A Primer of Technology"), biographic data ("Selected Works Dealing with Scientific Communication and Transfer of Technology at the University of Minnesota, 1970-75"), scientific roles in the public ("Scientific Communication in the Urban Environment: Implications for Political Decision-Making"), education sectors ("Integrating Career Competencies into the Communication Curriculum"), and statistical methods for audience analysis ("A Priori Methods for Packaging Scientific Information").

The Center has sponsored seminars dealing with scientific information transfer, environmental impact assessment, environmental mediation and bioscientific communication.

Center sponsored experimental research has begun with three surveys based on a World Food Needs Conference held April 25, 1975, at the University of Minnesota. Experiments were designed to determine (1) attitudes, (2) level of knowledge of various audiences toward world food needs, and (3) ranking and/or rating of credibility dimensions of conference participants. Several groups of students completed the questionnaire: high school students,

Agricultural College students, Minneapolis Campus students, Agricultural College faculty, and Minneapolis Campus faculty. The results suggest that different messages may need to be created for each audience as each group has different attitudes toward the subject, levels of knowledge and attitudes toward the speaker.

Presently, several research proposals are under consideration by outside sponsoring agencies. One, submitted to the National Science Foundation, will investigate the behavior of people engaged in informational retrieval by devising a system to research scientific and technical informational networks. The proposal calls for developing a prototype data search system based on Donohew and Tipton's information seeking model (involving goals, beliefs, and knowledge of each user; self-evaluation; and information handling "sets," plus mechanisms to establish priority levels of information, information format preference, monitoring of feedback, and reversal or switching capabilities).

The Center's most ambitious research proposal was submitted to the National Science Foundation in December, 1975. The proposal involves innovative communication systems for small scientific communities and presents an exploratory project to develop a media information network for a small group of scientists and engineers investigating new sources of energy from agro-organic matter. At the present this scientific community does not have a formal information network for sending and/or receiving research information. Our country's energy needs make such fuel research a high priority item, and fuel development from agro-organic matter has been called the most promising direction of energy research. The establishment of a coherent communication network among those involved in this research may be

of great value in finding solutions to the energy problem. The Center's proposal would meet this group's communication need by first identifying individuals researching agro-organic fuels and then developing a time-compressed audio tape information network among them. The results of the study could indicate that new communication systems are necessary to promote the increasingly essential transfer of scientific information.

The Center also has been included in a consultative capacity in a proposal to the Agency for International Development (AID). The Resource Analysis Laboratory of the Department of Biology at American University, will be the principal research group for this proposal which will utilize satellite data to investigate resource development problems in West Africa. (see Figure 1 for a breakdown of major themes and projects)

Future Projects

The future focus of the Center will be systematic and experimental analysis of communication variables in channel information exchange among scientists from different disciplines and among scientists and target populations. The opinion leadership of professional linkers, the performance of project directors as professional linkers and the classroom as a complex, ever-changing communication system are additional areas for research.

One study will involve a questionnaire designed to identify opinion leaders among scientists in the College of Agriculture. Then, the opinion leaders will be asked to report their communication behavior. Jain (1976) points out that opinion leadership is one of the most significant concepts to aid understanding of communication and social influence in relatively

large systems. Considering the complexity of information needs of scientists, the growing interdependence between disciplines and their external environment, the existence between formal and informal interpersonal relationships among members, and the high amount of face-to-face communication in formal organizations, it seems that opinion leadership is a significant phenomena of communication. Furthermore, as Richmond and McCroskey (1975) indicate, opinion leadership depends to a large extent on the degree of communication with information sources outside of the person's social system and the degree of involvement within (internal) his own system. An opinion leadership study may assist the opinion leader to become interdisciplinary in his or her approach.

Another study will focus on the role of the research administrators as "integrators." That is, the integrator is a facilitating leader, maximizing the decision-making capacities of various subgroups which he links. Galbraith (1973) asserts: "The integrator should conceive of his role as a facilitating one rather than a doing one." The integrator should posses what Schleon and Day (1975) have termed "lateralization of knowledge, a comprehension of knowledge in several fields providing ability to communicate at several interfaces." Evaluation could be completed by the Center and disciplines involved in research projects. By providing research administrators with constructive feedback, they will increase their efficiency as technical communicators.

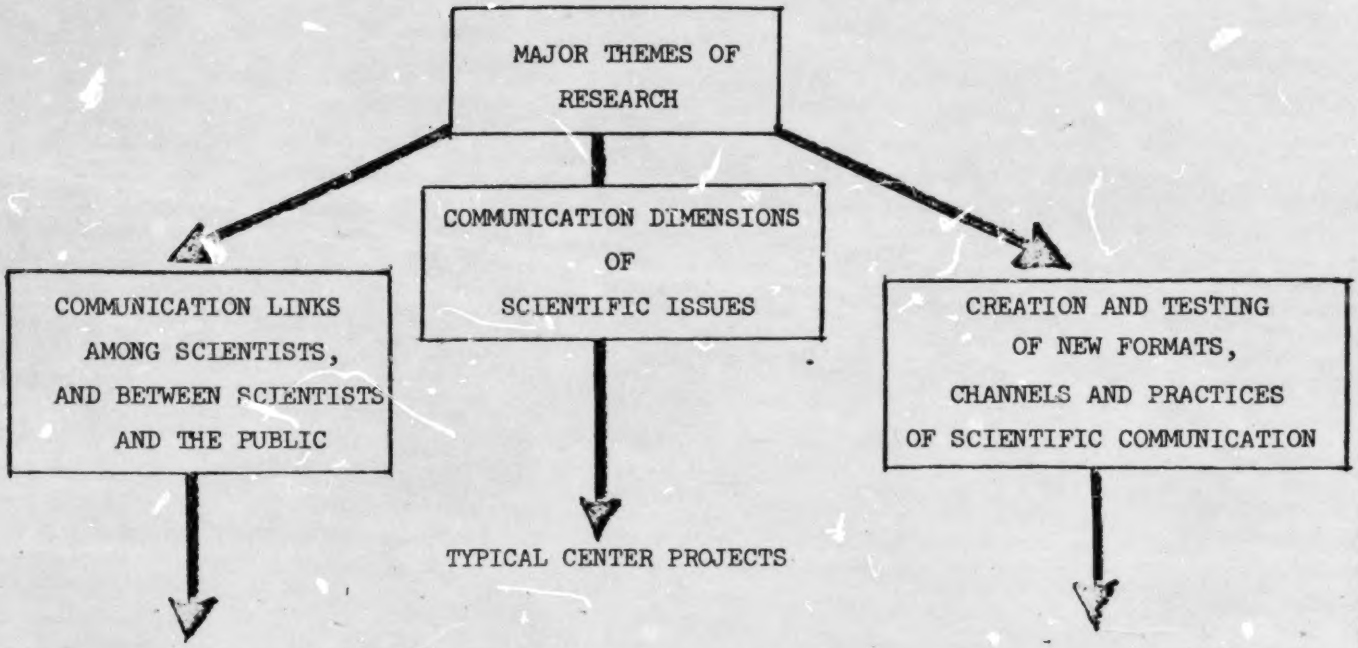
A third study will deal with helping scientists improve teaching methods. As Clark (1971) points out "The classroom must be managed as a complex everchanging communication system composed of a multiple number

of human variables; and these human variables must determine how communication skills can be employed for the clearest, most appropriate communication in a given situation, in class and out." The objective will be to link the bridge between student and teacher.

These proposed projects will utilize opinion leaders, integrators, and communication specialists as linkers. The opinion leader study will involve members from various disciplines in the College of Agriculture who have been identified as opinion leaders within departments. Opinion leaders will be evaluated in terms of their ability to interface information exchange with other disciplines and to increase lateralization of knowledge within departments. In the integrator study, members of the Center will evaluate the integrator's ability to interface with various disciplines involved in projects. The communication specialists will evaluate agricultural scientists in terms of their ability to convey scientific information and will evaluate the performance variables during various presentations.

The Center will also conduct correlative communication research projects involving such variables as scientists' interaction patterns, information-seeking processes, interdisciplinary communication, specialist vocabulary barriers, channel or media preference, feedback assessment and research across major theme areas.

Through continued research the Center will provide a core of materials in the area of management of research and development so sorely needed in both the public and private sectors. The Center will continue to amass materials, resources, and experimental models for directors of research and development in State and Federal agencies as well as scientifically-based or technology-oriented business and industry.


MAJOR THEMES OF RESEARCH
COMMUNICATION LINKS AMONG SCIENTISTS, AND BETWEEN SCIENTISTS AND THE PUBLIC
COMMUNICATION DIMENSIONS OF SCIENTIFIC ISSUES
CREATION AND TESTING OF NEW FORMATS, CHANNELS AND PRACTICES OF SCIENTIFIC COMMUNICATION

TYPICAL CENTER PROJECTS

"Linker project" with scientists at the University of Minnesota and undergraduate research assistants in technical communication.

"Selected Works Dealing with Scientific Communication and the Transfer of Technology at the University of Minnesota" (research monograph).

Development of a prototype guidebook for the administration of technology transfer/scientific communication (National Science Foundation proposal).

Information search and retrieval (National Science Foundation-Mid west Research proposal).

"Scientific Communication in the Urban Environment: Implications for Political Decision-Making" (a paper presented at the annual conference of the International Communication Association).

A study of communication variables based on the Proceedings of the World Food Needs Conference.

Technology assessment of controlled environment agriculture (National Science Foundation proposal).

The editing and publishing of the Proceedings of the World Food Needs Conference.

"A Burkeian Analysis of Three Speeches Presented at the World Food Needs Conference

"A Primer on Technology Assessment" (research monograph).

Development of an experimental periodical for agriculture: systematic assessment of communication effects (National Science Foundation proposal).

Innovative communication systems for small scientific communities (National Science Foundation proposal

A proposal to develop an office of environmental mediation at the University of Minnesota

"Integrating Career Competencies into the Communication Curriculum" (a paper delivered at the convention of the Central States Speech Association)

An Investigation of Channel and Speaker Delivery Effect of Attitude and Cognitive Change and Judgments of Credibility Dimensions of Three Speakers.

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